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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/824,195	04/14/2004	Richard John Mitro	GAT 0087 PA/40304.173	5883

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EXAMINER
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LANDRUM, EDWARD F

ART UNIT	PAPER NUMBER
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3724

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
/ 3 MONTHS	01/04/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

## Office Action Summary

Application No.

10/824,195

Applicant(s)

MITRO ET AL.

Examiner

Edward F. Landrum

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 11/10/2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 7-10, 19-21, 24, 29-31 and 40 is/are pending in the application.
- 4a) Of the above claim(s) 7, 9 and 30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 7, 8, 10, 19-21, 24, 29, 31 and 40 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 April 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 8/25/2006.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Drawings***

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "50" has been used to designate both oscillation frequency control and the externally mounted frequency control. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Objections***

2. Claim 40 is objected to because of the following informalities: The use of the terms "oscillation frequency control" and "externally mounted frequency control" is confusing as the terminology makes it sound like the externally mounted frequency control is not part of the oscillation frequency control but instead an entirely separate entity. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the

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art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 40, 8, 10, 19-21, 24, 29, and 31 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter that was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

It is not understood how the cutting depth indicator can indicate the cutting rate. It is understood that yes the cutting depth will change at a specific rate due to the oscillation of the cutting tool but the minimal cutting speed as indicated by page 4 of the specification is 18kHz. But, the majority of human beings cannot see the flickering of a light bulb or television that operates at a frequency of 120 Hz, which is considered a minimal flicker free frequency. The cutting device of the instant application is oscillating at over 100 times the frequency, at minimum, that is considered flicker free. No human eye would be able to identify the cutting rate by visually looking at the cutting tool or a cutting depth indicator during operation of the cutting mechanism as both the cutting tool and any numeric value of the cutting depth indicator would be changing too fast to properly identify any movement at all. How does a user identify the cutting rate visually with the cutting depth indicator if the tool is moving too fast for the eye to see?

Furthermore, how does the oscillation frequency control allow a user to observe the cutting rate of the tool if it is impossible for a user to observe the cutting rate via the cutting depth indicator, and isn't the oscillation frequency the cutting rate as frequency is measured in Hz, and 1Hz is one complete cycle therefore making the oscillation

frequency the exact same as the cutting rate? Furthermore, how can the oscillation frequency be a function of an audible signal, isn't the audible signal dependent on the oscillation frequency?

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 40, 19, 20, 29, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takabayashi et al (U.S Patent No. 5,101,599), hereinafter Takabayashi, in view of Devine (U.S Patent No. 4,409,659), in further view of Cossen et al (U.S Patent No. 6,073,058), hereinafter Cossen, Kuris (U.S Patent No. 3,610,080), and Rozdilsky et al (U.S Patent No 3,699,719).

Takabayashi teaches (see Figures 1 and 2) an object support platform (54) and an object table (52), a cutting tool mount (26) with a cutting tool (14) secured to it, and a piezoelectric transducer (12) is configured oscillate the cutting tool (14) along a cutting axis that is perpendicular to an object support plane. An oscillation frequency control (see Figure 2) has a voltage controlled oscillator (30) that is coupled to the drive unit (12). A circuit (Col. 1, lines 45-69; also see Col. 2, lines 1-16) functions as a potentiometer as it measures a reference voltage and compares it with an unknown voltage thereby controlling the amplitude of the piezoelectric transducer. The amplitude

of the tool (14) may be adjusted manually by changing the reference voltage that is measured by the circuit that acts as a potentiometer (Col. 2, lines 38-46).

Takabayashi teaches all of the elements of the current invention as stated above except: a cutting depth indicator being used to indicate the position of the cutting tool along the cut axis and a cutting rate at which the tool moves along the cutting axis during a cutting operation; the oscillation frequency control permitting variation of the oscillation frequency by means of an externally mounted control attached to the potentiometer; and the oscillation frequency control allowing the oscillation frequency to be changed by a user after a user observes both audible and visual signals generated by the cutting mechanism; and the resonant frequency of the cutting tool falling within a frequency range of the oscillation frequency control.

Devine teaches (Col. 1, lines 30-40) that it is old and well known in the art to use and audible and visual observations to help set the oscillation frequency of the cutting tool manually.

It would have been obvious to have modified Takabayashi to incorporate the teachings of Devine to provide a means to manually adjust the oscillation frequency make the ultrasonic cutter more efficient. Furthermore using audible or visual signals to identify problems with cutting efficiency would help identify broken tool bits as well as identify whether an object being cut was too hard or the tool bit was too soft to cut effectively.

Cossen teaches (Col. 20, lines 50-60; also see Figures 7A, 7B, and 10) that it is old and well known in the art to provide a tool position display (165) comprising a cutting

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depth indicator (193) to accurately find a tool position at any point throughout a cutting operation. A user would inherently be able to determine the cutting rate of an ultrasonic tool by reading the change in depth of the cutting tool along the z-axis.

It would have been obvious to have modified Takabayashi to provide a tool positioning display with a cutting depth indicator for the ultrasonic cutter, as ultrasonic cutters have already been used in 3D CNC modeling devices for parts such as turbines and providing a display system that mapped the tool position as well as a real time cutting depth indicator would allow a user to easily watch the construction of the device being cut as well as make sure that the cutting rate, the depth of cut, etc were all correct.

Kuris teaches (see Figure 1) providing an externally accessible frequency control (29) to provide a user with an easy means to change the oscillation frequency of the ultrasonic cutting device. The device is adjustable between 16Khz and 100 Khz and can be manually adjusted, but more preferably automatically adjusted to match the resonant frequency of the cutting tool even when the resonant frequency of the blade changes during a cutting operation (Col 3, lines 62-75; Col. 4, lines 1-8).

It would have been obvious to have modified Takabayashi to incorporate the teachings of Kuris to provide an externally mounted knob for the oscillation frequency control to allow a user to easily adjust the oscillation frequency of the cutting tool manually when fine adjustments for the cutting tool were necessary.

Rozdilsky teaches (Col. 1, lines 67-68, Col. 2, lines 1-5) that it is old and well known to manufacture the cutting tool of an ultrasonic machine to a size and shape to match the frequency of the resonating device.

It would have been obvious to have modified Takabayashi to incorporate the teachings Rozdilsky to provide a cutting tool that matched the resonant frequency of the resonating device. Oscillating a tool at its resonant frequency will provide a cleaner cut and help prevent excessive wear and damage to the cutting tool, thereby prolonging the life of the cutting tool.

The modified device of Takabayashi meets the limitations of claim 40, except that it employs a circuit rather than a potentiometer in order to measure the electromotive force of the cutting tool by comparing an unknown voltage to a known voltage. However, because these two elements were art-recognized equivalents at the time of the invention in those circuit applications where it is immaterial what the electrical device is composed of as long as it measures the same thing, one of ordinary skill would have found it obvious to substitute a potentiometer for the circuit of the modified device of Takabayashi.

7. Claim 8, is rejected under 35 U.S.C. 103(a) as being unpatentable over the modified device of Takabayashi in view of Calkins (U.S Patent No. 5,303,510).

The modified device of Takabayashi teaches all of the elements of the current invention as stated above except the oscillation frequency being able to vary between 20 and 41 khz, and the object support platform configured to accommodate slurry from a slurry supply.



Calkins teaches (Col. 1, lines 12-25) teaches that a standard ultrasonic tool is oscillated in a range of 20-40 khz if using a slurry in the cutting process. Calkins also teaches (see Figure 3; Col. 4 lines 41-61) the use of a cutting slurry (30) being conveyed to a work piece from a slurry supply (24).

It would have been obvious to have modified the modified device of Takabayashi to incorporate the teachings of Calkins to allow the oscillation frequency of the cutting tool to vary between 20 and 40 khz if a slurry was being used thereby allowing the cutting tool to cut at the most efficient frequency thereby increasing the overall effectiveness of the slurry. Furthermore, providing slurry and having a supply of slurry readily available would increase the overall effectiveness of the cutting process by allowing particles already cut to be removed from the work piece, thereby making the cutting process for efficient.

8. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over the modified device of Takabayashi, as stated in section 6.

The modified device of Takabayashi teaches all of the elements of the current invention as stated above except the oscillation frequency control permitting variation of the oscillation frequency at increments of less than 0.2kHz.

It would have been an obvious matter of design choice to modify the modified device of Takabayashi by allowing for the oscillation frequency to be changes in increments of less than .2 khz, since applicant has not disclosed that having the size of the increments the oscillation frequency can be changed by solves any stated problem

or is for any particular purpose and it appears that the cutting tool would perform equally well with the oscillation frequency changing in almost any reasonably sized increment.

9. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over the modified device of Takabayashi, as stated in section 6.

The modified device of Takabayashi teaches all of the elements of the current invention as stated above except the voltage controlled oscillator comprising an electronic circuitry comprising a control voltage input section, a voltage controlled oscillator stage, and a power driver section.

It would have been an obvious matter of design choice to modify the modified device of Takabayashi by having the voltage oscillator comprising a control voltage input section, a voltage controlled oscillator stage, and a power drive section, since applicant has not disclosed that having this specific circuit structure solves any stated problems or is for any particular purpose and it appears that the oscillating cutter would perform equally well with almost any circuit configuration provided the voltage controlled oscillator still performed the same function.

10. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over the modified device of Takabayashi, as stated in section 6.

The modified device of Takabayashi teaches all of the elements of the current invention as stated above except the cutting tool being removable from the cutting tool mount.

It would have been an obvious matter of design choice to modify the modified device of Takabayashi by making cutting tool detachable from the cutting tool mount,

quick release tool mounts are old and well known in the art and applicant has not disclosed that having the cutting tool be removable solves any stated problem or is for any particular purpose and it appears that the cutting machine would work equally well with or without the cutting tool being detachable from the tool mount.

***Response to Arguments***

11. Applicant's arguments with respect to claims 7-10, 19-21, 24, 29, 31, and 40 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Baba et al (U.S Patent No. 5,177,902), Erlenmaier (U.S Patent No. 4,951,375), Kostar et al (U.S Patent No. 6,932,682), Jugler (U.S Patent No. 3,561,462), Sherry (U.S Patent No. 3,595,453), Horton (U.S Patent No. 3,679,526), Benderly (U.S Patent No. 6,612,906), and Rozdilsky (U.S Patent No. 3,699,719) teach elements of the instant application.

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edward F. Landrum whose telephone number is 571-272-5567. The examiner can normally be reached on Monday-Friday 8-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Boyer Ashley can be reached on 571-272-4502. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

EFL

12/19/2006

  
BOYER D. ASHLEY  
SUPERVISORY PATENT EXAMINER